

CLAIMS

What is claimed is:

1. A stage comprising:

a rotating shaft to which a chuck is mounted;

5 an annular rotary drive coupled to said rotating shaft, said rotary drive rotates said rotating shaft; and

a linear drive coupled to said rotating shaft, said linear drive moves said rotating shaft along a vertical axis, said linear drive extending through the center of said annular rotary drive.

10 2. The stage of Claim 1, further comprising:

a base that moves in a linear horizontal direction; and

a platform moveably coupled to said base, said platform moving in a linear vertical direction with respect to said base, said rotating shaft rotatably coupled to said platform, said platform having a first side and a second side opposing said first side, wherein said annular 15 rotary drive is coupled to said first side and said linear drive is coupled to said second side.

3. The stage of Claim 2, wherein said first side is the top side of said platform and said second side is the bottom side of said platform.

20 4. The stage of Claim 2, said platform has an inner section and an outer section, wherein said annular rotary drive is coupled to said outer section and wherein said inner section extends through the center of said annular rotary drive.

25 5. The stage of Claim 2, further comprising a rotary bearing disposed between said platform and said rotating shaft; wherein said linear drive is coupled to said rotating shaft through said platform and said rotary bearing.

6. The stage of Claim 2, further comprising a linear bearing disposed between said base and said platform.

7. The stage of Claim 1, wherein said linear drive is a voice coil motor.

8. The stage of Claim 7, further comprising a spring coupled to said rotating shaft, wherein said spring biases said rotating shaft along said vertical axis, wherein said voice coil motor

5 drives said rotating shaft along said vertical axis by overcoming said bias.

9. The stage of Claim 8, wherein said spring is coupled to said annular rotary drive and extends through the center of said annular rotary drive, said spring biases said annular rotary drive along said vertical axis.

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10. The stage of Claim 1, wherein said linear drive coupled to said rotating shaft is a first linear drive, said stage further comprising:

15 further comprising a second linear drive that is coupled to said rotating shaft, said annular rotary drive, and said first linear drive, said second linear drive moves said rotating shaft, said annular rotary drive, and said first linear drive in a horizontal direction.

11. A stage comprising:

a rotating shaft to which a chuck is mounted;

a means for rotating said rotating shaft; and

20 a means for driving said rotating shaft along a vertical axis, said means for driving said rotating shaft is on the same horizontal plane as said means for rotating said rotating shaft.

12. The stage of Claim 11, wherein said means for driving said rotating shaft along a vertical axis extends through the center of said means for rotating said rotating shaft.

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13. The stage of Claim 11, wherein said means for rotating said rotating shaft comprises an annular rotary driver coupled to said rotating shaft.

14. The polar coordinate of Claim 13, wherein said annular rotary driver comprises a stator and a rotor, one of which is mounted to said rotating shaft and the other of which is coupled to said means for driving said rotating shaft along a vertical axis.
- 5 15. The polar coordinate of stage of Claim 11, wherein said means for driving said rotating shaft along a vertical axis comprises a voice coil motor coupled to said means for rotating said rotating shaft.
- 10 16. The stage of Claim 15, wherein said voice coil motor comprises a magnet and a coil one of which is mounted to a platform, said platform is coupled to said means for rotating and is rotatably coupled to said rotating shaft, said platform extends through the center of said means for rotating said rotating shaft.
- 15 17. The stage of Claim 16, wherein said means for driving said rotating shaft further comprises a spring for biasing said rotating shaft along a vertical axis.
- 20 18. A method of moving a stage, said method comprising:
driving a shaft along a vertical axis; and
rotating said shaft about the driver that drives said shaft along said vertical axis, such that said shaft and driver are on the same horizontal plane.
19. The method of Claim 18, further comprising driving said shaft and said driver that drives said shaft along said vertical axis in a horizontal direction.
- 25 20. The method of Claim 18, further comprising, biasing said shaft along said vertical axis and wherein driving said shaft along said vertical axis comprises applying a force to overcome said bias.